about in front of the female, exhibiting his brilliantly coloured throat and fins to their best advantage.

During a short absence from my post of observation, the pair was disturbed by fishermen with casting-nets and never returned to the nest.

We see, however, that it is the male only who constructs the nest, and it is not until the latter is completely finished that he goes out in search of a mate. This is by no means unusual; and a similar state of things has been described in the American Cichlid, *Geophagus brasiliensis*, and in many Centrarchids.

The native fishermen confirmed my observations and informed me that they made use of their knowledge by catching the large males over the holes, the fish being too occupied by their nest-making to be easily disturbed.

I was unfortunately unable to witness the oviposition; but an intelligent native whom I cross-examined informed me that male and female repair together to the nest where the eggs are deposited, the female later taking them into her mouth. He ridiculed the idea of a reverse process of parturition, which Loat asserts to be the belief of some of the Nile fishermen.

A number of fish were brought to me containing ova or young in the mouth; these, as was to be expected*, all proved to be females. One specimen, carrying young measuring about 10 mm. in length, had the oviducts full of large ripe eggs, and was evidently prepared to mate again as soon as the first brood was disposed of, as already ascertained by Pellegrin† in *Tilapia galilæa*.

6. A Revision of the Oriental Pelobatid Batrachians (Genus *Megalophrys*). By G. A. Boulenger, F.R.S., V.P.Z.S.

[Received April 6, 1908.]

(Plates XXII.–XXV.‡ and Text-figure 78.)

My attention has been drawn to the generic characters of the Pelobatidæ of the Oriental Region through the notes published by Mr. Beddard a year ago in these 'Proceedings'§ on the anatomy of *Megalophrys nasuta*, in which he stated that the single specimen examined by him had procœlous vertebræ, whereas the genus *Megalophrys* had been defined by Cope and myself as having the vertebræ opisthocœlous. A skeleton of an adult *Megalophrys nasuta* which I had prepared confirmed Mr. Beddard's statement; but at the same time I find the vertebræ to be procœlous also in some specimens of *M. montana*, the type of the genus, and of *M. longipes*, of which species other specimens

* *Cf.* G. A. Boulenger, Tr. Zool. Soc. xvii. 1906, p. 538
† Mém. Soc. Zool. France, xvi. 1904, p. 311.
‡ For explanation of the Plates, see p. 430.
§ P. Z. S. 1907, p. 324.

showed them to be opisthocœlous. It is therefore clear that the character, however important it may appear at first, is worthless even as a specific character in these Batrachians. I had to a certain extent foreseen this result in 1882 *, when I refused to divide these frogs into larger groups according to the mode of articulation of the vertebræ, as had been done by Cope † and Lataste ‡, remarking that: "In this case, this character does not seem to me to be of such importance as was believed by some authors. It has been noticed that, in some individuals of various species, the intervertebral spheres do not become firmly attached to either centrum at maturity, and one adult specimen of *Xenophrys monticola* in the British Museum exhibits a very anomalous mode of articulation, the fourth vertebra being biconcave, the fifth biconvex, the others procœlian." Curiously, I was soon after censured by R. Blanchard § for not having divided the Tailless Batrachians into two primary groups: the Opisthocœlous and the Procœlous.

Still I persisted in using the character of the opisthocœlous vertebræ for separating *Megalophrys* from *Leptobrachium*, with which I had been obliged to unite Günther's *Xenophrys* when it was shown that the presence or absence of vomerine teeth could not be used as a generic character in this group ||. Now an unexpected discovery shows the last genus to be still more closely related to the first.

Some time ago, whilst collecting in Darjeeling, Dr. Annandale found some curious tadpoles agreeing so closely with those of *Megalophrys montana*, first described from Java by Prof. Max Weber and since found in the Malay Peninsula. However, owing to the fact that *M. montana* has never been recorded from the Himalayas, whilst *Xenophrys monticola* (now called *Megalophrys parva*) is common there, doubts arose in his mind as to the correctness of the identification, and he sent me a large series of specimens, adult and young, of the latter species, together with several specimens of the problematic larva, one of which has the limbs fully developed. A study of this material has convinced me that the so-called *Xenophrys monticola* has the same sort of tadpole as *Megalophrys montana*, so closely resembling it that I can only distinguish it by the whitish colour of the belly, which in the Malay species is dark brown. I have therefore no hesitation in abandoning the genera *Xenophrys* and *Leptobrachium* and uniting them with the first-described *Megalophrys*. And as the species are in want of revision, I have seized this opportunity for submitting them all to a renewed study, the results of which appear in this paper.

Before proceeding with the descriptions of the species, I wish to reply to two criticisms of Beddard's in the above-quoted paper.

* Cat. Batr. Ecaud. p. 432. † J. Acad. Philad. (2) vi. 1866, p. 67.
‡ Actes Soc. Linn. Bord. xxx. 1879, p. 330.
§ Bull. Soc. Zool. France, 1885, p. 584.—Reply by Boulenger, op. cit. 1886, p. 320. || Ann. Mus. Genova, (2) vii. 1889, p. 750.

First, he remarks that I am mistaken in describing *Megalophrys* as with "outer metatarsals united," in opposition to *Pelobates* with "outer metatarsals separated by web." He finds that "both frogs agree in the separation by web, only that the web is more extended towards the tip of the toes in *Pelobates*." The figure given by him of *Megalophrys* (fig. 92, p. 326) shows, however, that the web does not extend into the metatarsal part of the foot, the outer metatarsal segments being completely bound together by the integument; whilst in *Pelobates*, when spread out, they are seen to be separated by a deep groove into which the web penetrates, as in the true Frogs.

Secondly, Mr. Beddard still thinks the fusion of the coccyx with the sacral vertebra to be an important character in *Megalophrys nasuta*, although I have shown it to be variable in *Pelobates*. I find it to be likewise variable in *Megalophrys*, as may be seen from the following notes on various vertebral columns examined by me:—

In a dry skeleton of *M. montana* and in two smaller specimens in spirit of the same species, which I examined when preparing the 'Catalogue of Batrachians' published in 1882, I found the præsacral vertebræ, 8 in number, opisthocœlous, and the coccyx articulating with the sacral vertebræ by one condyle, as stated by Cope. In another skeleton, which has since been prepared, the vertebræ are procœlous, and the coccyx is likewise distinct from the sacral vertebra.

In a skeleton of a large *M. nasuta*, from Kina Balu, in which the dermal ossification forms a complete roof over the skull, similar to but thinner than that of *Pelobates cultripes*, and not extending over the temples, the vertebral column is as in the second specimen of *M. montana*, except that the coccyx is immovably fixed to the sacrum, although the line of separation is visible on the lower aspect. Exactly the same condition obtains in a large *M. major*. In a smaller specimen of *M. nasuta* from the same locality the coccyx is quite free from the sacral vertebra and the vertebræ are opisthocœlous.

Text-fig. 78.

Vertebral column of *Megalophrys pelodytoides*, ventral aspect.

The vertebræ are procœlous or opisthocœlous in *M. longipes*, and the coccyx is completely fused with the sacrum.

In several specimens of *M. parvus* the vertebræ are procœlous and the coccyx is free and movable.

A skeleton of *M. pelodytoides* is interesting as showing an anomaly somewhat similar to one described by Howes in *Bombinator* *. Anomalies, we know, are frequent in the Discoglossidæ and also in *Pelobates* †. There are two triangular

* Proc. Anat. Soc. 1890, p. xvi, fig.

† *Cf.* Adolphi, Morphol. Jahrb. xx. 1895, p. 449, pl. xix.

sacral diapophyses on the left side—the first on the ninth vertebra, as normal, the second being part of the coccyx; on the right side the ninth vertebra has a slender diapophysis, as on that preceding it, and the triangular process forms part of the coccyx.

I have alluded above to irregularities in the mode of articulation of the vertebræ, which lose all systematic importance from the fact that, in these lowly forms, the intervertebral sphere of cartilage which is at first distinct from the so-called centra, as they ossify, become attached either to the vertebra anterior or posterior to each, if not remaining independent. We may thus find, on the same vertebral column, procœlous, opisthocœlous, or amphicœlous vertebræ; and it is now quite clear that such a character is worthless in the Pelobatidæ even as a specific character. I may add that the same will probably be found to be the case in the Hemiphractidæ. Brocchi has described the vertebræ of *Hemiphractus* as opisthocœlous. I have not been able to verify the statement, but I find them procœlous in a skeleton of the closely-allied *Ceratohyla bubalus*.

Genus Megalophrys Kuhl.

Pupil erect. Tongue circular or pyriform, entire or nicked and free behind. Vomerine teeth in two small groups, if present. Tympanum distinct or hidden under the skin. Fingers free, toes free or shortly webbed; outer metatarsals united. Sternum with a bony style. Coccyx, if distinct from the sacral vertebra, with simple articulation.

South-eastern Asia.

Synopsis of the Species.

I. Profile of snout obliquely truncate, strongly projecting beyond lower jaw; canthus rostralis angular and loreal region vertical or slightly oblique.

A. Head at least once and a half as broad as long (to occiput); tibio-tarsal articulation not reaching eye; vomerine teeth usually present; tympanum hidden or feebly distinct.

End of snout without or with a mere indication of a dermal appendage; outer border of upper eyelid produced in the adult into a pointed appendage, which does not, as a rule, measure more than half diameter of eye ..... 1. *M. montana* Kuhl.

Snout terminating in a pointed dermal appendage; outer border of upper eyelid produced into a pointed appendage, which is at least $\frac{2}{3}$ diameter of eye in the adult ... 2. *M. nasuta* Schleg.

B. Head not more than once and two-fifths as broad as long; tympanum distinct.

1. Tibio-tarsal articulation reaching beyond eye; vomerine teeth present.

Upper eyelid with a horn-like tubercle; tibia $1\frac{1}{2}$ to $1\frac{2}{3}$ times in length from snout to vent; toes with a slight rudiment of web ..... 3. *M. longipes* Blgr.

Upper eyelid without appendage; tibia $1\frac{3}{5}$ to 2 times in length from snout to vent; toes $\frac{1}{4}$ to $\frac{1}{3}$ webbed ..... 4. *M. major* Blgr.

2. Tibio-tarsal articulation not reaching beyond eye (rarely slightly beyond); tibia at least twice in length from snout to vent; toes with a slight rudiment of web.

Vomerine teeth present; tympanum about ½ diameter of eye, which equals the distance between the two ..... 5. *M. robusta* Blgr.
Vomerine teeth present; tympanum ⅔ to ¾ diameter of eye, which is less than the distance between the two... 6. *M. parva* Blgr.
Vomerine teeth none; tympanum ⅔ to ¾ diameter of eye, which is less than the distance between the two..... 7. *M. boettgeri* Blgr.

II. Snout rounded or vertically truncate, not or but feebly projecting beyond lower jaw.

A. Tibio-tarsal articulation reaching the eye, or beyond; head as long as broad or slightly broader than long; tympanum perfectly distinct; no vomerine teeth.

Tibio-tarsal articulation reaching tip of snout; tibia a little more than ½ length from snout to vent; snout rounded ..... 8. *M. gracilis* Gthr.
Tibio-tarsal articulation reaching eye; tibia ½ length from snout to vent; snout truncate ..... 9. *M. heteropus* Blgr.
Tibio-tarsal articulation reaching eye or between eye and nostril; tibia ½, or a little less than ½, length from snout to vent; snout rounded..... 10. *M. pelodytoides* Blgr.

B. Tibio-tarsal articulation not reaching the eye; tympanum feebly distinct or hidden.

1. Head not more than once and ⅓ as broad as long; no vomerine teeth; toes ¼ to ½ webbed.

Foot longer than head ..... 11. *M. boulengeri* Bedr.
Foot as long as head ..... 12. *M. hasseltii* Tsch.

2. Head at least once and ¾ as broad as long; one or several conical tubercles on upper eyelid; vomerine teeth usually present.

Loreal region very oblique; toes ¼ to ½ webbed ..... 13. *M. carinensis* Blgr.
Loreal region very oblique; toes nearly free or with a mere rudiment of web ..... 14. *M. feæ* Blgr.
Loreal region vertical; toes with a mere rudiment of web ..... 15. *M. baluensis* Blgr.

1. Megalophrys montana.

Megophrys monticola Kuhl, Isis, 1822, p. 475.

Megalophrys montana Kuhl, in Férussac, Bull. Sc. Nat. ii. 1824, p. 83; Wagler, Syst. Amph. p. 204 (1830); Tschudi, Class. Batr. p. 82 (1838); Dum. & Bibr. Erp. Gén. viii. p. 458 (1841); Günth. Cat. Batr. Sal. p. 36 (1858), and Ann. & Mag. N. H. (4) xi. 1873, p. 419; Bouleng. Cat. Batr. Ecaud. p. 442 (1882); M. Weber, Ann. Jard. Bot. Buitenzorg, xv. Suppl. ii. 1898, p. 5; Laidlaw, Proc. Zool. Soc. 1900, p. 889; Annandale, Fasc. Mal., Zool. ii. p. 275 (1903).

Ceratophrys montana Gravenh. Delic. Mus. Zool. Vratisl. p. 47 (1829); Schleg. Abbild. p. 29, pl. x. fig. 3 (1837).

Ceratophryne montana Schleg. Handl. Dierk. ii. p. 57 (1858).

Megalophrys montana, part., Günth. Rept. Brit. Ind. p. 413 (1864).

Megalophrys montana, var. *aceras*, Bouleng. in Annandale & Robins. Fasc. Mal., Zool. p. 131, pl. v. fig. 1 (1903).

Tongue entire or feebly nicked behind. Vomerine teeth usually present, in two widely separated small groups just behind the level of the choanæ. Head large, 1½ to 1¾ times as

broad as long, usually defined behind by a more or less distinct transverse fold; snout truncate or obtusely pointed, projecting beyond lower jaw, as long as or a little shorter than eye; canthus rostralis sharp; loreal region vertical or a little oblique, concave; nostril equally distant from eye and from end of snout; interorbital space concave, its width $1\frac{1}{2}$ to 2 times that of upper eyelid (narrower in the very young); tympanum usually feebly distinct, rarely hidden, its diameter $\frac{1}{2}$ to $\frac{2}{3}$ that of eye, from which it is separated by a distance equal to the diameter of the latter. Fingers obtuse or feebly swollen at the end, first as long as or a little longer than second, which measures $\frac{2}{3}$ to $\frac{3}{4}$ length of third; no subarticular tubercles; no distinct metacarpal tubercles. Toes rather short, obtuse or feebly swollen at the end, with a mere rudiment of web or, at most, $\frac{1}{4}$ webbed; no subarticular tubercles; a flat, very indistinct inner metatarsal tubercle. Tibio-tarsal articulation reaching the shoulder, the commissure of the jaws, or the temple; tibia $\frac{3}{8}$ to $\frac{1}{2}$ length from snout to vent; foot as long as or shorter than tibia. Skin of upper parts smooth or with scattered conical warts, old specimens with bony deposits on the head and anterior part of the back; a strong glandular fold from eye to shoulder, usually another on each side of the back; upper eyelid with a sharp, raised edge, which is produced into a more or less distinct point or "horn"; this point may be very indistinct (var. *aceras* Blgr.), or very much developed, measuring nearly $\frac{2}{3}$ diameter of eye; as a rule it does not measure more than $\frac{1}{2}$ diameter of eye; an indication of a similar appendage on the tip of the snout rarely present*; a more or less developed pointed tubercle usually present behind the commissure of the jaws; limbs usually with oblique transverse glandular ridges; throat smooth, belly with small tubercles. Olive-brown above, uniform or variously marked with darker or lighter; a more or less distinct large triangular dark spot between the eyes, the base forwards, and a dark oblique bar below the eye; limbs with more or less distinct dark cross-bars; lower parts pale brown, spotted or marbled with darker; a white tubercle on each side of the breast. Male without vocal sac.

Measurements of specimens from Java :—

	♂.	♀.	
From snout to vent	55	88	millim.
Length of head (to occiput)	19	27	,,
Width of head	29	43	,,
Length of snout	6	8	,,
Diameter of eye	6	8	,,
Interorbital width	10	14	,,
Diameter of tympanum	4	4	,,
Distance between eye and tympanum	6	9	,,
Fore limb	35	53	,,
Hand	16	23	,,
Hind limb	70	110	,,
Tibia	23	35	,,
Foot	21	35	,,

* In a specimen from Java, where the species is most abundant.

Originally described from Java, this curious-looking frog has since been found in other parts of the Malay Archipelago and in the Malay Peninsula. The numerous specimens in the British Museum are from Java, Borneo, Palawan, Balabac, Samar and Dinagat Ids. (Philippines), Sumatra, and Bukit Besar in Jalor.

It is a sluggish and thoroughly nocturnal animal. Nothing has been observed concerning its breeding-habits; but I find the eggs to be large, those in the oviduct of a specimen 83 millim. long measuring 3 millim. in diameter. The larvæ were first described by Max Weber* from Java, and Laidlaw† and Annandale‡ have published observations on specimens obtained in the Malay Peninsula. These tadpoles are found in mountain-streams with gravelly beds and are remarkable for the funnel-like float formed by the lips, which are beset with minute horny teeth; these are not connected in any way with definite ridges or lamellæ, but radiate along the anterior surface of the funnel. According to Annandale, the funnel-shaped lip is capable of assuming two very distinct forms, according to the position of the tadpole:—(1) When the animal is hanging from the surface-film, as it frequently does, this structure becomes a translucent rhomboidal or lozenge-shaped float, depressed in the centre towards the mouth, but otherwise nearly flat; (2) when, on the other hand, the animal is resting on the bottom, the float takes on the appearance of a pair of slender processes, continued upwards on the sides, like a pair of horns. As in other Pelobatidæ, the spiraculum is sinistral. The tail is more than twice as long as the body, the total length of the largest tadpole being about 40 millim. The coloration is of a very dark brown, even on the belly.

2. Megalophrys nasuta. (Plate XXII.)

Ceratophrys montana, var., Schleg. Abbild. p. 30 (1837).

Megalophrys montana (non Kuhl), Cantor, Cat. Mal. Rept. p. 140 (1847).

Ceratophryne nasuta Schleg. Handl. Dierk. ii. p. 57, pl. iv. fig. 72 (1858); Günth. Cat. Batr. Sal. p. 36 (1858).

Megalophrys montana, part., Günth. Rept. Brit. Ind. p. 413 (1864).

Megalophrys chysii Edeling, Tijdschr. Nederl. Dierk. 1864, p. 205, and Nat. Tijdschr. Nederl. Ind. xxvii. 1864, p. 265, pl. —.

Ceratophrys nasuta Schleg. Dierentuin, Rept. p. 58, fig. (1872).

Megalophrys nasuta Günth. Ann. & Mag. N. H. (4) xi. 1873, p. 419; Bouleng. Cat. Batr. Ecaud. p. 443 (1882); S. Flower, Proc. Zool. Soc. 1899, p. 913; Werner, Zool. Jahrb., Syst. xiii. 1900, p. 498; Isenschmid, Mitth. Nat. Ges. Bern, 1903, p. 21; Beddard, Proc. Zool. Soc. 1907, p. 324, figs.

Tongue entire or feebly nicked behind. Vomerine teeth present, in two widely separated small groups on a level with the posterior border of the choanæ. Head large, $1\frac{1}{2}$ to 2 times as broad

* Ann. Jard. Botan. Buitenzorg, 1898, Suppl. ii. p. 5.
† Proc. Zool. Soc. 1900, p. 889.
‡ Fascic. Malay., Zool. p. 275 (1903).

as long, usually defined behind by a more or less distinct transverse fold; snout truncate in profile, pointed from above, and projecting beyond lower jaw, as long as or a little shorter than eye; canthus rostralis sharp; loreal region vertical or a little oblique, concave; nostril equally distant from eye and from end of snout; interorbital space concave, its width $1\frac{1}{2}$ to 2 times that of upper eyelid (narrower in the very young); tympanum often hidden; if distinct, its diameter $\frac{1}{2}$ to $\frac{2}{3}$ that of eye, from which it is widely separated. Fingers obtuse or feebly swollen at the end, first as long as or a little longer than second, which measures $\frac{2}{3}$ to $\frac{3}{4}$ length of third; no subarticular tubercles; no distinct metacarpal tubercles. Toes rather short, obtuse or feebly swollen at the end, with a mere rudiment or web or, at most, $\frac{1}{4}$ webbed *; no subarticular tubercles; a flat, very indistinct inner metatarsal tubercle. Tibio-tarsal articulation reaching the shoulder or the commissure of the jaws †; tibia $\frac{1}{3}$ to $\frac{2}{5}$ length from snout to vent; foot a little shorter than tibia. Skin of upper parts smooth or with a few scattered warts; adult with bony deposits on the head and anterior part of the back, which may completely fuse with the skull, and form a bony shield on the præsacral part of the body; a glandular fold from eye to shoulder, sometimes continued on the side of the body; another fold usually present higher up on the back, from behind the head to the sacral region; frequently, but not constantly, a subconical tubercle on the scapular region and another in the middle of the sacral region; similar tubercles, exceptionally, on the head; upper eyelid with a sharp, raised edge, produced into a long point or "horn," which is at least $\frac{2}{3}$, and often quite, as long as the eye in the adult; a similar, but shorter appendage on the end of the snout, and a still smaller one at the angle of the jaws; limbs with or without oblique transverse glandular ridges; lower parts smooth, or belly with small tubercles. Olive-brown above, uniform or variously marked with darker and lighter; a more or less distinct **Y**-shaped dark marking between the eyes and on the occiput; a dark oblique bar below the eye; lower parts dark brown, or spotted or marbled with dark brown. Male with an internal vocal sac.

Measurements of two specimens from Sumatra, found pairing by Dr. H. O. Forbes:—

	♂.	♀.	
From snout to vent	82	125	millim.
Length of head (to occiput)	24	36	,,
Width of head	41	60	,,
Length of snout	8	12	,,
Diameter of eye	7	11	,,
Interorbital width	13	20	,,
Diameter of tympanum	4	6	,,
Distance between eye and tympanum	8	16	,,

* Isenschmid (*l. c.*) describes a specimen from Sumatra in which the toes are nearly half webbed.

† The eye in a specimen from Sumatra, according to Isenschmid (*l. c.*).

	♂.	♀.	
Fore limb	54	74	millim.
Hand	20	31	,,
Hind limb	96	134	,,
Tibia	30	42	,,
Foot	29	40	,,

Known from the Malay Peninsula (Penang, Perak), Sumatra, Borneo, and the Natuna Islands.

The above description is almost a repetition of that of *M. montana*, so closely are these species allied to each other. As I mentioned in 1882, the only important difference between the two resides in the greater length of the palpebral horn-like appendage, and the presence of a similar appendage on the tip of the snout in *M. nasuta*. To this may be added the somewhat more anterior position of the vomerine teeth in *M. nasuta*.

Dr. H. O. Forbes has observed the frog to pair, in Sumatra*, on the banks of streams, the male embracing the female round the lumbar region. Recently transformed young, some with remains of the larval tail, measuring 15 to 17 millim. from snout to vent, were obtained in Penang by Capt. Flower; the palpebral and rostral appendages are absent in three very young specimens, and I do not see how they can be distinguished from *M. montana* at a similar stage of development.

3. Megalophrys longipes.

Megalophrys longipes Bouleng. Proc. Zool. Soc. 1885, p. 850, pl. lv.; Günth. Ann. & Mag. N. H. (5) xx. 1887, p. 316; A. L. Butler, Journ. Bombay N. H. Soc. xv. 1904, p. 400.

Tongue feebly nicked behind. Vomerine teeth in two small groups just behind the level of the choanæ. Head moderate, much depressed, once and $\frac{1}{4}$ as broad as long; snout obliquely truncate in profile, projecting beyond lower jaw, nearly as long as eye; canthus rostralis sharp; loreal region vertical, concave; nostril equally distant from eye and from end of snout; interorbital space concave, as broad as or a little broader than upper eyelid; tympanum distinct, $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye, its diameter equal to or less than its distance from eye. Fingers slender, feebly swollen at the end, first as long as or a little longer than second, which measures about $\frac{2}{3}$ length of third; no subarticular tubercles; no distinct metacarpal tubercles. Toes long and slender, feebly swollen at the end, with a slight rudiment of web; no subarticular tubercles; no distinct metatarsal tubercle. Tibio-tarsal articulation reaching beyond tip of snout, knee reaching axil or shoulder; tibia $\frac{3}{5}$ to $\frac{2}{3}$ length from snout to vent; foot shorter than tibia. Skin smooth above, with small warts on the flanks, and two pairs of delicate glandular folds originating on the scapular region and converging posteriorly, the outer extending to the sacral region; a strong fold from the eye to the shoulder; a

* 'A Naturalist's Wanderings in the Eastern Archipelago' (London, 1885), p. 154.

short horn-like tubercle on outer edge of upper eyelid; lower parts smooth. Olive-brown above; sides of head with oblique dark bars; a large triangular dark marking between the eyes; limbs with dark cross-bars; hinder side of thighs dark brown, with one or two round whitish spots; belly dotted or spotted with brown; throat and breast dark brown, or with large dark brown spots or symmetrical markings. Male with an internal vocal sac.

	♂.	♀.	
From snout to vent	47	65	millim.
Length of head (to occiput)	14	19	,,
Width of head	17	23	,,
Length of snout	4	6	,,
Diameter of eye	5	6	,,
Interorbital width	5	8	,,
Diameter of tympanum	3	$3\frac{1}{2}$	,,
Distance between eye and tympanum	4	6	,,
Fore limb	31	43	,,
Hand	12	16	,,
Hind limb	83	118	,,
Tibia	27	38	,,
Foot	22	33	,,

Only known from the mountains of Perak, in the Malay Peninsula, between 3000 and 4500 feet. Mr. A. L. Butler has observed it to be the commonest frog on the hills above 3000 ft. and to be entirely nocturnal, being found in the daytime under logs, rocks, or in holes in banks, and in densely shaded spots among dead leaves. These frogs appear to be quite bewildered by the sunlight, and when disturbed give one jump into the open and make no other attempt to escape. When seized in the hand they frequently open their mouths widely for some seconds. Mr. Butler has never seen this frog enter water of its own accord, and he suspects very large ova ($\frac{1}{2}$ inch in diameter), containing tadpoles with the hind limbs and tail well developed, which he found under damp moss on tree-trunks, to belong to it.

4. Megalophrys major, n. n. (Plate XXIII.)

Xenophrys gigas Jerdon, Proc. As. Soc. Beng. 1870, p. 85, and in Anders. Proc. Zool. Soc. 1871, p. 200.

Xenophrys monticola, part., Anders. l. c.; Bouleng. Cat. Batr. Ecaud. p. 441 (1882).

? *Ixalus lateralis* Anders. Journ. As. Soc. Beng. xl. 1878, p. 29, and Anat. Zool. Res. Yunnan, p. 844, pl. lxxviii. fig. 5 (1879).

Leptobrachium monticola, part., Bouleng. Ann. Mus. Genova, (2) vii. 1889, p. 720, Faun. Ind., Rept. p. 510 (1890), and Ann. Mus. Genova, (2) xiii. 1893, p. 344.

Tongue entire or feebly nicked behind. Vomerine teeth in two small groups on a line with the posterior border of the choanæ. Head moderate, more strongly depressed than in the preceding

species, $1\frac{1}{4}$ to $1\frac{2}{5}$ times as broad as long; snout obliquely truncate in profile, projecting beyond lower jaw, nearly as long as the eye; canthus rostralis sharp; loreal region vertical or slightly oblique, concave; nostril equally distant from eye and from end of snout; interorbital space flat or slightly concave, as broad as or a little broader than upper eyelid; tympanum more or less distinct, about half diameter of eye, the distance between eye and tympanum nearly equal to $\frac{3}{4}$ or once the diameter of the former. Fingers with feebly swollen tips, first as long as or a little shorter than second, which measures about $\frac{2}{3}$ length of third; no subarticular tubercles; no distinct metacarpal tubercles. Toes moderate, with swollen tips, $\frac{1}{4}$ to $\frac{1}{3}$ webbed, the web extending as a lateral fringe; no subarticular tubercles; metatarsal tubercle flat, indistinct. Tibio-tarsal articulation reaching the tip of the snout or a little beyond, rarely only to between eye and nostril; tibia a little more than $\frac{1}{2}$ or $\frac{3}{5}$ (rarely only $\frac{1}{2}$) length from snout to vent; foot considerably shorter than tibia. Skin smooth, or with fine granular asperities on the back; fine glandular ridges may be present on the body and across the limbs, one on each side of the back being constant and a V-shaped one behind the head very frequent; a glandular fold from the eye to the shoulder. Brown above, with darker, light-edged symmetrical markings, the most constant being a triangular spot between the eyes; a dark band capping the end of the snout as far as the nostrils and extending along the loreal and temporal regions to the shoulders; a light streak along the upper lip, sometimes interrupted by a dark brown bar below the eye; limbs with irregular dark cross-bands; hinder side of thighs dark brown, with a round white spot, which is nearer the leg than the vent; belly whitish, throat and breast brown or marbled with brown, with darker, light-edged spots on the lower lip, the last of which extends as a curved band to the anterior face of the arm. Male with a subgular vocal sac and fine brown nuptial asperities on the inner side of the first and second fingers.

Measurements of type specimens from Darjeeling:—

	♂.	♀.	
From snout to vent	77	94	millim.
Length of head (to occiput)	22	25	,,
Width of head	29	36	,,
Length of snout	9	10	,,
Diameter of eye	9	10	,,
Interorbital width	8	10	,,
Diameter of tympanum	4	5	,,
Distance between eye and tympanum	7	9	,,
Fore limb	48	59	,,
Hand	21	26	,,
Hind limb	127	162	,,
Tibia	41	51	,,
Foot	37	45	,,

This frog was indicated, rather than described, by Jerdon in 1870, from specimens collected by him at Darjeeling and in the Khasi Hills, now preserved in the British and Indian Museums. Further allusion to it was made soon after by J. Anderson, who regarded it however as the adult of Günther's *Xenophrys monticola*. After examining about 50 specimens, measuring 32–94 millim. from snout to vent, I am convinced that Jerdon was right. Most of the specimens in the Indian Museum are from Cherrapunji, Khasi Hills. I have examined specimens from the Karin Hills, in Upper Burma, and from the Man Son Mts., Tonkin (3000–4000 feet). If I am right in regarding Anderson's *Ixalus lateralis* as a young *M. gigas*, the range of the species extends to Western Yunnan.

I regret the name chosen by Jerdon cannot be used for this species, as there is an earlier *Megalophrys gigas* Blyth, 1854, which is, however, a synonym of *Rana liebigii* Gthr. I have therefore proposed the new name *Megalophrys major*.

5. Megalophrys robusta, sp. n. (Plate XXIV.)

Tongue feebly nicked behind. Vomerine teeth in two small groups on a line with or just behind the posterior borders of the choanæ. Head moderate, once and $\frac{2}{5}$ as broad as long; snout obliquely truncate in profile, projecting beyond lower jaw, as long as eye; canthus rostralis sharp; loreal region slightly oblique, concave; nostril equally distant from eye and from end of snout, or slightly nearer the former; interorbital space concave, broader than upper eyelid; tympanum distinct, about half diameter of eye, which equals the distance between the two. Fingers with feebly swollen tips, first as long as or a little longer than second, which measures about $\frac{2}{3}$ length of third; no subarticular tubercles; no distinct metacarpal tubercles. Toes moderately long, with feebly swollen tips, with a very slight rudiment of web; no subarticular tubercles; metatarsal tubercle flat, indistinct. Tibiotarsal articulation reaching the eye, or between eye and nostril; tibia $\frac{1}{2}$ or a little less than $\frac{1}{2}$ length from snout to vent; foot a little shorter than tibia. Skin of upper parts smooth or finely granulate; a fine glandular ridge on each side of the back and a V-shaped one behind the head; a strong glandular fold from the eye to the shoulder. Brown above; a triangular dark marking between the eyes; a dark temporal band and a dark vertical bar below the eye; other dark bars sometimes present on the upper lip; hind limbs with indistinct dark cross-bars; hinder side of thighs dark brown, with a round light spot nearer the leg than the vent; belly white; throat and breast spotted or marbled with brown.

Measurements of two specimens in the Indian Museum, Calcutta:—

	♀.	Hgr.
From snout to vent	114	54 millim.
Length of head (to occiput)	30	15 ,,

	♀.	Hgr.
Width of head	43	21 millim.
Length of snout	10	5 ,,
Diameter of eye	10	5 ,,
Interorbital width	13	6 ,,
Diameter of tympanum	4	$2\frac{1}{2}$,,
Distance between eye and tympanum	10	5 ,,
Fore limb	66	36 ,,
Hand	27	14 ,,
Hind limb	165	85 ,,
Tibia	53	27 ,,
Foot	49	25 ,,

I have examined five specimens, all from Darjeeling, collected by Dr. J. Gammie, and preserved in the Calcutta Museum. I have been allowed to retain one (here figured) for the British Museum.

6. Megalophrys parva.

Xenophrys monticola Günth. Rept. Brit. Ind. p. 414, pl. xxvi. fig. H (1864).

Xenophrys monticola, part., Anders. Proc. Zool. Soc. 1871, p. 200; Bouleng. Cat. Batr. Ecaud. p. 441 (1882).

Leptobrachium monticola, part., Bouleng. Ann. Mus. Genova, (2) vii. 1889, p. 720, and Faun. Ind., Rept. p. 510 (1890).

Leptobrachium parvum Bouleng. Ann. Mus. Genova, (2) xiii. 1893, p. 344, pl. xi. fig. 2.

Tongue entire or feebly nicked behind. Vomerine teeth in two small groups on a line with or just behind the posterior borders of the choanæ. Head moderate, $1\frac{1}{4}$ to $1\frac{1}{3}$ times as broad as long; snout obliquely truncate in profile, projecting beyond lower jaw, nearly as long as eye; canthus rostralis sharp; loreal region vertical, concave; nostril equally distant from eye and from end of snout; interorbital space flat, as broad as upper eyelid; tympanum more or less distinct, $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye, the distance between the two less than the diameter of the latter. Fingers with feebly swollen tips, first as long as or a little shorter than second, which measures about $\frac{2}{3}$ length of third; no subarticular tubercles; no distinct metacarpal tubercles. Toes rather short, with feebly swollen tips, with a slight rudiment of web, often with a feeble dermal ridge on the lower surface, but without subarticular tubercles; metatarsal tubercle flat, indistinct. Tibiotarsal articulation reaching the eye or not quite so far; tibia $\frac{1}{2}$ or a little less than $\frac{1}{2}$ length from snout to vent; foot shorter than tibia. Skin of upper parts smooth or granular, with small glandular warts which may form symmetrical ridges, very variable in arrangement; a strong glandular fold from the eye to the shoulder; lower parts perfectly smooth. Brownish above, with more or less distinct darker symmetrical markings, the most constant of which forms a triangle or a Y between the eyes; some of the warts edged with blackish; upper lip with vertical dark

bars; limbs with more or less regular dark cross-bars; hinder side of thighs marbled with brown, usually with a round light spot nearer the leg than the vent; lower parts whitish, throat and breast spotted or marbled with brown, or with brown symmetrical marking; a round white spot often present on each side of the breast. Male with a subgular vocal sac, and with fine brown nuptial rugosities on the first and second fingers.

	♂.	♀.	
From snout to vent	42	52	millim.
Length of head (to occiput)	11	15	,,
Width of head	14	19	,,
Length of snout	4	5	,,
Diameter of eye	4½	6	,,
Interorbital width	4	5	,,
Diameter of tympanum	3	4	,,
Distance between eye and tympanum	3	4	,,
Fore limb	29	35	,,
Hand	11	13	,,
Hind limb	65	73	,,
Tibia	21	24	,,
Foot	18	20	,,

The type specimens of *Xenophrys monticola* *, in the British Museum, are from the Sikkim Himalayas and the Khasi Hills. Others, from Darjeeling (*Jerdon*) and Pegu (*Theobald*), are preserved in the same Institution. I have examined about 40 specimens from Darjeeling and Cherrapunji belonging to the Calcutta Museum. *Leptobrachium parvum* was described from specimens obtained by Fea in the Karin Hills, Upper Burma.

No direct observations have been made on the habits of this species, but an inspection of the oviducts of females on the point of spawning show the eggs to be large, 2 millim. in diameter. Tadpoles obtained by Dr. Annandale at Kurseong and referred by him provisionally to *M. montana* of Kuhl † belong, I feel convinced, to this species, in which the toes are nearly free. These tadpoles, with funnel-shaped mouth, agree very closely with those of the former species, as known from specimens obtained by Messrs. Annandale and Robinson in the Malay Peninsula, differing only, so far as I can see, in the whitish belly.

7. Megalophrys boettgeri.

Leptobrachium boettgeri, Bouleng. Proc. Zool. Soc. 1899, p. 171, pl. xix. fig. 3.

Tongue entire. Vomerine teeth absent. Head moderate, 1⅕ to 1⅓ times as broad as long; snout obliquely truncate in profile, projecting beyond lower jaw, nearly as long as eye; canthus

* The specific name of which must be changed, as being preoccupied in the genus *Megalophrys*.

† Proc. As. Soc. Beng. (2) ii. 1906, p. 290.

rostralis sharp; loreal region vertical, concave; nostril equally distant from eye and from end of snout; interorbital space flat, as broad as upper eyelid; tympanum very distinct, $\frac{3}{5}$ to $\frac{2}{3}$ diameter of eye, equal to or greater than its distance from latter. Fingers with feebly swollen tips, first and second equal, about $\frac{2}{3}$ length of third; subarticular and carpal tubercles indistinct or absent. Toes slender, with feebly swollen tips, with a slight rudiment of web, often with a feeble dermal ridge on the lower surface, but without subarticular tubercles; a small, oval, flat inner metatarsal tubercle. Tibio-tarsal articulation reaching the eye; tibia $\frac{1}{2}$ or a little less than $\frac{1}{2}$ length from snout to vent; foot shorter than tibia. Skin smooth, with small scattered warts on the head and back; a glandular fold from the eye to the shoulder; two small white warts close together on the chin and one on each side of the breast near the insertion of the fore limb. Dark grey or brown above, with symmetrical blackish markings; upper surface of snout and scapular region light; a whitish blotch on the upper lip below anterior half of eye; limbs with dark cross-bands; a small round white spot on the back of the thigh; throat and breast brown or brownish; three longitudinal, blackish, light-edged markings on the throat; large blackish spots on the side of the belly; posterior part of belly and lower surface of thighs dirty white. Male with internal vocal sac.

	♂.	♀.	
From snout to vent	35	46	millim.
Length of head (to occiput)	11	12	,,
Width of head	13	15	,,
Length of snout	3	4	,,
Diameter of eye	4	5	,,
Interorbital width	$3\frac{1}{2}$	5	,,
Diameter of tympanum	$2\frac{1}{2}$	$3\frac{1}{2}$	,,
Distance between eye and tympanum	$2\frac{1}{2}$	3	,,
Fore limb	24	29	,,
Hand	10	12	,,
Hind limb	54	64	,,
Tibia	17	22	,,
Foot	15	19	,,

Described from six specimens obtained by Mr. J. D. La Touche at Kuatun, N.W. Fokien, China. A specimen from Kiukiang has been noticed by Boettger (Ber. Senck. Ges. 1894, p. 141) under the name of *Leptobrachium monticola*.

8. Megalophrys gracilis. (Plate XXV. fig. 1.)

Leptobrachium gracile Günth. Proc. Zool. Soc. 1872, p. 598; Bouleng. Cat. Batr. Ecaud. p. 440 (1882).

Tongue nicked behind. Vomerine teeth absent. Head moderate, as long as broad or slightly broader than long; snout rounded, not projecting beyond lower jaw, as long as or slightly shorter than orbit; canthus rostralis distinct; loreal region not

very oblique, concave; nostril a little nearer end of snout than eye; interorbital space a little narrower than upper eyelid; tympanum distinct, its diameter $\frac{1}{2}$ that of eye, from which it is separated by a space nearly equal to its own diameter. Fingers slightly swollen at the end, first and second equal and about $\frac{2}{3}$ length of third; no subarticular tubercles; two metacarpal tubercles, inner very large, outer small. Toes rather long and slender, with blunt or slightly swollen tips, with a very short web at the base; no subarticular tubercles, but a more or less distinct dermal ridge along the lower surface; a feebly prominent, elliptical inner metatarsal tubercle. Tibio-tarsal articulation reaching tip of snout; tibia a little more than $\frac{1}{2}$ length from snout to vent; foot shorter than tibia, but longer than head. Skin smooth; a curved glandular fold above tympanum. Greyish olive to dark olive above, with more or less distinct darker spots or symmetrical markings on the head and body and cross-bars on the limbs; the type specimen has a whitish spot below the eye, and the upper arm and elbow whitish; lower parts dirty white, with or without irregular brown spots. Male unknown.

Measurements of ♀ (type specimen):—

From snout to vent	44	millim.
Length of head (to occiput)	15	,,
Width of head	16	,,
Length of snout	5	,,
Diameter of eye	5	,,
Interorbital width	4	,,
Diameter of tympanum	$2\frac{1}{2}$	,,
Distance between eye and tympanum	$2\frac{1}{2}$	,,
Fore limb	33	,,
Hand	12	,,
Hind limb	71	,,
Tibia	23	,,
Foot	19	,,

Young specimens with remains of the larval tail measure as much as 30 millim., whilst a female ready to spawn measures only 41. The eggs in the oviduct are very large and comparatively few, the diameter of the vitellus being 2 millim.

Founded on a single specimen from Matang, Borneo, this species has since been found on Mount Kina Balu, Borneo, and at Gunong Tahan, Pahang, in the Malay Peninsula, at an altitude of 5200 feet.

9. Megalophrys heteropus. (Plate XXV. fig. 2.)

Leptobrachium heteropus Bouleng. Ann. & Mag. N. H. (7) vi. 1900, p. 186.

Tongue nicked behind. Vomerine teeth absent. Head moderate, as long as broad; snout truncate at the end, not projecting beyond lower jaw, a little shorter than orbit; canthus

rostralis strong; loreal region not very oblique, concave; nostril a little nearer end of snout than eye; interorbital space as broad as upper eyelid; tympanum distinct, its diameter $\frac{1}{2}$ that of eye, from which it is separated by a space equal to its own diameter. Fingers blunt, first and second equal and about $\frac{2}{3}$ length of third; no subarticular tubercles; two metacarpal tubercles, inner very large, outer small. Toes moderately long, blunt, webbed at the base only, the web continued as a slight fringe along each side; a strong dermal ridge or keel along the lower surface of the third and fourth toes; a small, feebly prominent, oval inner metatarsal tubercle. Tibio-tarsal articulation reaching eye; tibia $\frac{1}{2}$ length from snout to vent; foot shorter than tibia, but longer than head. Skin smooth, with small tubercles on the upper eyelids. Grey above, with darker light-edged symmetrical markings, the largest occupying the middle of the back; a black lumbar spot; a black canthal and temporal streak; black spots on the sides; dark cross-bars on the limbs; lower parts grey, speckled with black; a round whitish spot on each side of the breast, at the base of the arm, another on the back of each thigh.

Measurements of the single (♀) specimen:—

From snout to vent	33	millim.
Length of head (to occiput)	11	,,
Width of head	11	,,
Length of snout	4	,,
Diameter of eye	4	,,
Interorbital width	3	,,
Diameter of tympanum	2	,,
Distance between eye and tympanum	2	,,
Fore limb	22	,,
Hand	8	,,
Hind limb	48	,,
Tibia	16	,,
Foot	13	,,

A single specimen from the Larut Hills, Perak, 3500 ft., formerly in the Selangor Museum, is now in the British Museum.

10. Megalophrys pelodytoides.

Leptobrachium pelodytoides Bouleng. Ann. Mus. Genova, (2) xiii. 1893, p. 345, pl. xi. fig. 3.

Tongue notched behind. Vomerine teeth absent. Head moderate, as long as broad or a little broader than long; snout rounded, scarcely projecting beyond lower jaw, a little shorter than orbit; canthus rostralis distinct; loreal region oblique, concave; nostril equally distant from eye and from end of snout; interorbital space as broad as upper eyelid; tympanum distinct, its diameter $\frac{1}{2}$ or $\frac{2}{3}$ that of eye, from which it is separated by a space equal or inferior to its own diameter. Fingers with slightly swollen tips, first and second equal and about $\frac{3}{5}$ length of third;

no subarticular tubercles; two metacarpal tubercles, inner large, outer small. Toes moderately long, with slightly swollen tips, one-third webbed or less, the web extending as a fringe along each side, and with a more or less distinct dermal ridge along the lower surface; a small, feebly prominent, oval inner metatarsal tubercle. Tibio-tarsal articulation reaching eye, or between eye and nostril; tibia $\frac{1}{2}$, or a little less than $\frac{1}{2}$, length from snout to vent, as long as or slightly longer than foot. Upper parts with small smooth warts, lower smooth. Olive above, with dark spots, marblings, or symmetrical markings, which may be edged with lighter; upper lip with dark vertical bars; limbs with dark cross-bars; sometimes a round, white, dark-edged spot on back of thighs, nearer tibia than vent; white beneath, throat of male brown. Male with an internal subgular vocal sac.

The largest type specimen measures 37 millim. from snout to vent. The following are the measurements of an adult male from Burma (one of the types) and of a female from Tonkin in the British Museum :—

	♂.	♀.	
From snout to vent	30	42	millim.
Length of head (to occiput)	10	14	,,
Width of head	10	15	,,
Length of snout	$3\frac{1}{2}$	5	,,
Diameter of eye	$3\frac{1}{2}$	5	,,
Interorbital width	3	4	,,
Diameter of tympanum	2	3	,,
Distance between eye and tympanum	$1\frac{1}{2}$	2	,,
Fore limb	19	26	,,
Hand	8	11	,,
Hind limb	46	57	,,
Tibia	15	19	,,
Foot	15	18	,,

This species was discovered in the Karin or Karennee Hills, east of Toungoo, between Burma and Siam, by the late L. Fea. The types were obtained at Thao (1300–1400 m.) and in the district of the Karin Bia-po. I refer to this species a number of specimens from a collection made in the Man-Son Mountains (3000–4000 feet) in Tonkin, on the Kwangsi frontier. These specimens differ from the types only in having the web between the toes less developed, being reduced to a rudiment in females, whilst none of the male specimens can be said to have them more than one-fourth webbed. Yet these specimens were procured during the breeding-season, the abdomen of the female being distended with very large ova (diameter of vitelline sphere 2 millim.). In all other respects, however, the resemblance with the typical *M. pelodytoides* is so great that I cannot adopt any other course than to regard them as specifically identical, a course which is fully justified by the amount of variation in this character exemplified by *M. hasseltii*.

11. Megalophrys boulengeri.

Leptobrachium boulengeri Bedriaga, Przewalski Exped., Amph. p. 63, pl. i. fig. 7 (1898).

Tongue entire behind. Vomerine teeth absent. Head moderate, little broader than long; snout rounded, scarcely projecting beyond lower jaw, about as long as orbit; canthus rostralis distinct; loreal region oblique, feebly concave; nostril nearly equally distant from end of snout and from eye; interorbital space a little broader than upper eyelid; tympanum hidden. Fingers obtuse, not swollen at the end, first and second equal; no distinct subarticular tubercles; two moderately large carpal tubercles. Toes rather short, blunt, half-webbed, the web existing as a fringe to the tips; no distinct subarticular tubercles; inner metatarsal tubercles small, oval, feebly prominent. Tibio-tarsal articulation reaching the temple; tibia about $\frac{1}{3}$ length from snout to vent; foot longer than head. Upper parts warty, the warts of unequal size; a strong glandular fold from eye to shoulder; lower parts smooth, except posterior part of belly, which is granulate. Light greenish grey above, with an ill-defined olive-brown vertebral band which expands into two branches between the eyes; some of the larger warts also olive-brown; a dark canthal and temporal streak; lower parts yellowish.

From snout to vent	49	millim.
Length of head	14	,,
Width of head	15	,,
Length of snout	6	,,
Diameter of eye	$4\frac{3}{4}$	,,
Interorbital width	4	,,
Fore limb	29	,,
Hind limb	58	,,
Tibia	16	,,
Foot	19	,,

Dy-Chu River, Upper Yangtse Kiang, China.—Types in St. Petersburg Museum.

12. Megalophrys hasseltii. (Plate XXV. fig. 3.)

Leptobrachium hasseltii Tschudi, Class. Batr. p. 81 (1838); Günth. Cat. Batr. Sal. p. 36 (1858); Bouleng. Cat. Batr. Ecaud. p. 441 (1882), Zool. Rec. 1885, Rept. p. 24, Proc. Zool. Soc. 1890, p. 37, and Faun. Ind., Rept. p. 511 (1890); Isenschmid, Mitth. Nat. Ges. Bern, 1903, p. 20; Van Kampen, Zool. Jahrb., Syst. xxii. 1905, p. 712.

Rana hasseltii Schleg. Handl. Dierk. ii. p. 56, pl. iv. fig. 71 (1858).

Leptobrachium montanum Fischer, Arch. f. Nat. li. 1885, p. 44.

Tongue nicked behind. Vomerine teeth absent. Head large, about once and $\frac{1}{4}$ as broad as long; snout rounded, not projecting beyond lower jaw, about as long as orbit; canthus rostralis

distinct; loreal region very oblique, concave; nostril a little nearer end of snout than eye; interorbital space a little broader than upper eyelid; tympanum hidden or feebly distinct, its diameter $\frac{1}{2}$ to $\frac{2}{3}$ that of eye, from which it is separated by a space less than its own diameter. Fingers obtuse, not swollen at the end, first and second equal or first the longer, third nearly twice as long as second; subarticular tubercles, if distinct, irregular in their disposition; two moderately large carpal tubercles, inner a little larger than outer. Toes short, obtuse, like the fingers, webbed at the base in females, $\frac{1}{4}$ to $\frac{1}{2}$ webbed in males; third toe not reaching beyond base of antepenultimate phalanx of fourth; subarticular tubercles sometimes distinct, sometimes more or less confluent into an obtuse ridge; inner metatarsal tubercle small, oval, feebly prominent. Tibio-tarsal articulation reaching the shoulder; tibia $\frac{1}{3}$ to $\frac{2}{5}$ length from snout to vent; foot as long as head. Skin smooth or with small tubercles above, granular on belly; a glandular fold from eye to shoulder. Brown, grey, or pale olive above, with small or large dark brown spots or marblings, which may be irregular or form a symmetrical pattern; a more or less distinct dark canthal and temporal streak; sides of snout with dark vertical bars; limbs with dark cross-bars; throat and belly dirty white, or brown speckled with white. Male with an internal vocal sac.

	♂.	♀.	
From snout to vent	47	74	millim.
Length of head (to occiput)	16	23	,,
Width of head	20	31	,,
Length of snout	6	10	,,
Diameter of eye	5	9	,,
Interorbital width	6	10	,,
Diameter of tympanum	3	6	,,
Distance between eye and tympanum	2	4	,,
Fore limb	33	50	,,
Hand	11	16	,,
Hind limb	53	79	,,
Tibia	16	24	,,
Foot	15	23	,,

Burma, Malay Peninsula, Sumatra, Borneo, Palawan, Java.

The larva has been first noticed by me, from specimens from Sumatra and Perak, and others have since been obtained in Selangor by Mr. Butler, and in Perak by Dr. Hanitsch. These tadpoles are of the same type as the typical Pelobatids of Europe, but remarkable in being marked all over with numerous deep black dots or round spots. No observations have been made on the breeding-habits, but it is probable that the eggs are laid in the water, being similar to those of *Pelobates*. Eggs from the oviducts of a female 65 millim. long measure 2 millim. in diameter.

Mr. A. L. Butler observes (Journ. Bombay N. H. Soc. xv. 1904, p. 397) that the larval period of existence is very prolonged, and

that the tail does not disappear until the size of about 40 millim. (from snout to vent) is attained.

13. Megalophrys carinensis.

Leptobrachium carinense Bouleng. Ann. Mus. Genova, (2) vii. 1889, p. 748, and Faun. Ind., Rept. p. 511 (1890); W. Sclater, Proc. Zool. Soc. 1892, p. 347; Bouleng. Ann. Mus. Genova, (2) xiii. 1893, p. 345, pl. xii.

Tongue very indistinctly nicked behind. Vomerine teeth absent or in two widely separated small groups between the large choanæ *. Head very large and externally depressed, once and $\frac{3}{4}$ to twice as broad as long; snout rounded, as long as eye or orbit, not projecting beyond lower jaw; canthus rostralis distinct; loreal region very oblique, slightly concave; nostril equally distant from eye and from end of snout; interorbital space nearly twice as broad as upper eyelid; tympanum completely hidden. Fingers short, blunt or with slightly swollen tips, first and second equal, about $\frac{2}{3}$ length of third; no subarticular tubercles; metacarpal tubercles indistinct. Toes short, blunt or with slightly swollen tips, $\frac{1}{4}$ to $\frac{1}{2}$ webbed, the web extending as a slight fringe on each side; no subarticular tubercles; a very large, oval, flat inner metatarsal tubercle. Tibio-tarsal articulation reaching axil or shoulder in female, commissure of jaws in males; tibia $\frac{1}{3}$ to $\frac{2}{5}$ length from snout to vent; foot longer than head. Skin with bony deposits on head and anterior part of body; a strong transverse fold defines the head behind; a strong glandular fold from eye to shoulder; upper eyelid with conical tubercles, two to four of which may be enlarged and form very short "horns"; body with small scattered smooth warts, which are larger and may be conical on the sides; an oblique glandular fold, parallel with the supratemporal fold, on each side of back, as far as sacral region; more or less distinct oblique glandular folds across the limbs; throat finely granulate, belly nearly smooth. Upper surface of head and sides of body yellowish; back between the dermal ridges purplish grey (brown in spirit); eyes, dermal ridges, and larger tubercles bordered with black; some of the lateral tubercles pure white; limbs purplish grey; gular region brown or purplish black; belly brown or whitish. Male with an internal vocal sac.

	♂.	♀.	
From snout to vent	123	150	millim.
Length of head (to occiput)	33	37	,,
Width of head	58	70	,,
Length of snout	12	12	,,
Diameter of eye	10	12	,,

* The palate was toothless in the specimen originally described. Vomerine teeth were subsequently found, by Mr. W. Sclater and by myself, in other specimens. That the character is not of specific importance in this case is further evidenced by the fact that a large female specimen from Fea's collection has a group of vomerine teeth on the left side and no trace of them on the right side.

	♂.	♀.	
Interorbital width	17	22	millim.
Fore limb	66	72	,,
Hand	28	34	,,
Hind limb	137	160	,,
Tibia	45	51	,,
Foot	44	53	,,

Several specimens were obtained by the late L. Fea on the western slope of the Karin or Karennee Hills, east of Toungoo, Burma, at an altitude of 2500 feet or upwards. The species has been recorded from Mergui, Tenasserim, by W. L. Sclater. According to Fea, the males show themselves very irritable when disturbed, opening their wide gape, ready to bite at the slightest provocation, emitting at the same time a shrill cry. The female is of more gentle disposition. The strong jaws of this frog enable it to overpower small mammals, and a large female contained, in addition to insects, a small squirrel.

14. Megalophrys feæ.

Megalophrys feæ Bouleng. Ann. Mus. Genova, (2) iv. 1887, p. 512, and v. 1887, p. 423, pl. v.

Leptobrachium feæ Bouleng. op. cit. vii. 1889, p. 750, and Faun. Ind., Rept. p. 512 (1890).

Tongue feebly nicked behind. Vomerine teeth usually present, in two widely separated small groups just behind level of choanæ. Head very large and extremely depressed, once and $\frac{3}{4}$ to twice as broad as long; snout rounded, hardly as long as eye, not projecting beyond lower jaw; canthus rostralis distinct; loreal region very oblique, slightly concave; nostril equally distant from eye and from end of snout; interorbital space slightly concave, twice as broad as upper eyelid; tympanum completely hidden. Fingers short, blunt, first and second equal, $\frac{2}{3}$ length of third; no subarticular tubercles; metacarpal tubercles indistinct. Toes short, blunt, nearly free or with a mere rudiment of web at the base; no subarticular tubercles; a very large, oval, flat inner metatarsal tubercle. Tibio-tarsal articulation reaching axil, shoulder, or commissure of jaws; tibia $\frac{1}{3}$ to $\frac{2}{5}$ length from snout to vent; foot longer than head. Skin with bony deposits on head and anterior part of body; a strong transverse fold defines the head behind; a strong glandular fold from eye to shoulder; upper eyelid with tubercles, one of which is larger and conical and may be developed into a rather long horn-like appendage in the adult. Body and limbs above with scattered small smooth warts; no longitudinal glandular folds; lower parts smooth. Olive-brown above; a T- or Y-shaped darker marking on the head, the transverse branch between the eyes, often dividing the head into a lighter anterior and a darker posterior portion; a dark temporal band, the lip below it yellowish; lips, eyes, and some of the larger warts on the body edged with blackish; some of the warts whitish;

lower parts dirty white to dark brown; throat sometimes spotted with dark brown. Male with an internal vocal sac.

The type specimen, a female, measures 110 millim. from snout to vent.

Measurements of specimens in the British Museum :—

	♂.	♀.	
From snout to vent	82	106	millim.
Length of head (to occiput)	25	31	,,
Width of head	46	57	,,
Length of snout	8	10	,,
Diameter of eye	9	10	,,
Interorbital width	13	16	,,
Fore limb	45	55	,,
Hand	24	28	,,
Hind limb	98	130	,,
Tibia	31	39	,,
Foot	31	41	,,

M. fece was discovered by the late L. Fea in the Kakhyen Hills, east of Bhamo, Upper Burma. But the species extends further east, as the British Museum possesses a specimen obtained by Hr. Fruhstorfer in the Man-Son Mountains, Tonkin (altitude 3000–4000 feet); this specimen, in which the supraocular "horn" is very feebly developed and vomerine teeth are absent, I had first referred to *L. carinense* (Ann. & Mag. N. H. (7) xii. 1903, p. 186).

15. Megalophrys baluensis.

Leptobrachium baluense Bouleng. Ann. & Mag. N. H. (7) iv. 1899, p. 453, and Journ. Str. Br. As. Soc. xxxiv. 1900, pl. ii. fig. 1.

Tongue entire. Vomerine teeth in two widely separated small groups just behind level of choanæ. Head moderately large, much depressed, nearly twice as broad as long; skin adherent to the rugose skull; snout rounded, much shorter than orbit, not projecting beyond lower jaw; canthus rostralis strong; loreal region vertical, concave; nostril equally distant from eye and from end of snout; interorbital space slightly concave, nearly twice as broad as upper eyelid; tympanum feebly distinct, $\frac{3}{5}$ diameter of eye, about $\frac{1}{2}$ its distance from eye. Fingers rather elongate, slender, blunt, first a little longer than second, which is $\frac{2}{3}$ length of third; no subarticular tubercles; no metacarpal tubercles. Toes moderately long, slender, blunt, with a mere rudiment of web; no subarticular tubercles, but a feeble median ridge or keel under the toes; a very indistinct oval inner metatarsal tubercle. Tibiotarsal articulation reaching shoulder; tibia $\frac{2}{5}$ length from snout to vent; foot much longer than head. Skin perfectly smooth; a very small conical tubercle near the border of the upper eyelid, above the pupil. Back and upper surface of snout dark grey;

posterior half of upper surface and sides of head blackish brown; a curved light streak, the concavity turned forwards, across upper eyelids and interorbital region, followed by a Y-shaped blackish marking; two light spots on upper lip, below eye; large blackish-brown partly confluent spots on the back; sides dark brown, light-edged above; limbs dark brown, with rather indistinct darker cross-bars; throat brown, belly brownish white.

From snout to vent	65	millim.
Length of head (to occiput)	16	,,
Width of head	28	,,
Length of snout	4	,,
Diameter of eye	6	,,
Interorbital width	10	,,
Diameter of tympanum	$3\frac{1}{2}$	,,
Distance between eye and tympanum	7	,,
Fore limb	40	,,
Hand	18	,,
Hind limb	85	,,
Tibia	27	,,
Foot	27	,,

Known from a single female specimen, full of ripe eggs 3 millim. in diameter, discovered by Dr. Hanitsch on Mount Kina Balu, Borneo, at an altitude of 4200 feet.

EXPLANATION OF THE PLATES.

Plate XXII.

a. *Megalophrys nasuta*, p. 411. Brunei, Borneo.
b. Side view of head of *a*.
c. Head of specimen from Penang.

Plate XXIII.

Megalophrys major, p. 416. Type.
With side view of head.

Plate XXIV.

Megalophrys robusta, p. 418. Type.
With side view of head.

Plate XXV.

Fig. 1. *Megalophrys gracilis*, p. 421. Type.
1 *a*. Side view of head.
1 *b*. Lower view of hand, ×2.
1 *c*. „ „ foot, ×2.
Fig. 2. *Megalophrys heteropus*, p. 422. Type.
2 *a*. Side view of head.
Fig. 3. *Megalophrys hasseltii*, p. 425. Java.
3 *a*. Side view of head.